1. (a) Starting with the given equation \( C = x^2y \), we divide both sides by \( x^2 \):

\[
\frac{C}{x^2} = \frac{x^2y}{x^2}
\]

The \( x^2 \) terms cancel and you are left with \( y = \frac{C}{x^2} \).

(b) Using the equation from 1a (even if you got the wrong equation, you could still get credit if you used the equation you did get), you should have \( y = \frac{160}{4} = \frac{160}{16} = 10 \) feet.

2. (a) Again beginning with \( V = \frac{nRT}{P} \), you should cross-multiply to get \( PV = nRT \); then you would divide both sides by \( V \) to get

\[
\frac{PV}{V} = P = \frac{nRT}{V}
\]

(b) Similarly, cross-multiply first to get \( PV = nRT \); then divide both sides by \( RT \) to get

\[
\frac{PV}{RT} = \frac{nRT}{RT} = n
\]

3. (a) \( 22^3 \cdot 22^3 = 22^{3+3} = 22^6 \)

(b) \( \frac{6}{6^3} = 6^{1-3} = 6^{1+2} = 6^3 \)

(c) \( 5^{-2} \cdot 5^4 = 5^{(-2)+4} = 5^2 \)

(d) \( \frac{4^3 \cdot 4^2}{4^{-1}} = 4^{3+2-(-1)} = 4^{3+2+1} = 4^6 \)

4. For these questions, you were allowed to use your calculator to solve and convert each of the numbers. No excuse for missing any points on these.

(a) \( \frac{2.2 \times 10^{-11}}{1.1 \times 10^{-10}} = (i) 2.0 \times 10^{-1} = (ii) 0.2 \)

(b) \( \frac{5.0 \times 10^2 \cdot 9.9 \times 10^{12}}{2.1 \times 10^{11}} \approx (i) 2.357 \times 10^4 = (ii) 23570 \)

5. (a) \( \log(\sqrt{10}) = 0.5 \) converts to the equation \( 10^{0.5} = \sqrt{10} \)

(b) \( 10^x = 10000 \) converts to the equation \( \log(10000) = x \)

6. Using the calculator or your knowledge about the logarithms for powers of ten:

(a) \( \log(300) \approx 2.48 \)

(b) \( \frac{\log(10)}{\log(0.001)} = \frac{1}{-3} \approx -0.33 \)

7. Using the given equation with the value of \( l = 5.02 \times 10^{-9} \), you get

\[
dB = 10 \log \left( \frac{5.02 \times 10^{-9}}{10^{-12}} \right) = 10 \cdot \log (5.02 \times 10^3) \approx 10 \cdot 3.701 = 37.01dB
\]

8. The iron sculpture’s mass is reduced by 7% each year, which means that each year it maintains 93% of its mass. Thus the mass after \( t \) years will be \( y = 750 \cdot (0.93)^t \), and after 20 years this is \( 750 \cdot (0.93)^{20} \approx 175.68kg \).
9. The equation you should use for the number of bacteria is \( y = 500 \times 3^{10x} \), where \( x \) is the number of minutes.
   (a) After 30 minutes: \( y = 500 \times 3^{30} = 500 \cdot 3^3 = 13500 \).
   (b) After 35 minutes: \( y = 500 \times 3^{35} = 500 \cdot 3^{3.5} \approx 23383 \).

10. The only thing to notice here is that the time \( t \) is measured in days, so 6 weeks corresponds to \( t = 42 \) days.
    (a) After six weeks, \( W = 5000 - 1000 \cdot (0.8)^{42/7} \approx 4737 \) words.
    (b) Before she started studying means before any lessons, i.e. \( t = 0 \): \( W = 5000 - 1000 \cdot (0.8)^0/7 = 5000 - 1000 = 4000 \) words.